

REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Office Action dated January 29, 2004. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Information Disclosure Statement

Applicants hereby submit that the EPO Search Report was directed to the corresponding EP App. No. 00121116.8 (dated July 17, 2003) which corresponds to this U.S. application, and urge the Examiner to consider the Search Report and denote such consideration on the attached revised PTO-1449 form.

Status of the Claims

Claims 1-6 and 11 are under consideration in this application. Claims 1-4 and 11 are being amended, as set forth in the above marked-up presentation of the claim amendments, in order to more particularly define and distinctly claim applicants' invention.

Additional Amendments

The claims are being amended to correct formal errors and/or to better disclose or describe the features of the present invention as claimed. All the amendments to the claims are supported by the specification. Claims 16 and 17 are being added to eliminate the multiple dependent claims. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

Informality Rejections

Claims 2-4 and 11 were rejected under 35 U.S.C. 112, second paragraph, on the grounds of being vague and indefinite. As indicated, the claims have been amended as required by the Examiner. Accordingly, the withdrawal of the outstanding informality rejections is in order, and is therefore respectfully solicited.

Prior Art Rejections

Claims 1-6 and 11 remain rejected under 35 U.S.C. 102(b) as being anticipated by an article by WEN et al. in PNAS 1/1998 vol. 95, pp. 334-339 (hereinafter "Wen"). This rejection has been carefully considered, but is most respectfully traversed.

The method (e.g., Fig. 5) of the present invention is directed to displaying gene expression patterns of multiple genes whose expressions change according to experiment cases, where a first axis represents the genes and a second axis represents gene expression status of the experiment cases (e.g., Figs. 2-3 along a time line), the method recited in claim 1 comprises the steps of: designating a clustering-applied region 201 (T_{start} to T_{end}) along the second axis and a time segment 501 (with a length/width S) shorter than a time length of the clustering-applied region 201 ($S \leq \text{end-start}$); incrementally clustering the expression pattern data by the time segment 501 within the clustering-applied region 201 in a forward or reverse direction (Figs. 2-3) along the second axis (*"the end of the slit 501 has reached the end of the clustering-applied region 201, whereby the clustering process is ended"* p. 15, last paragraph; *"J is incremented to perform the next clustering (Step 710)"* p. 16, 2nd paragraph) by calculating similarity or dissimilarity (*"the similarity or dissimilarity which indicates correlation between the genes upon clustering"* p. 13, last paragraph) for clustering within a clustering range (T_{start} to $T_{\text{start}+S}$) as wide/long as the time segment 501 based on a respective reference value K set for each clustering range (*"The reference value for distinction between different clusters is a minimum value, namely threshold K , of dissimilarity between the clusters.... variably be set as K_{start} , $K_{\text{start}+1}$,..., K_{end} , the level of clustering may be regulated to be brief or detailed along the time axis."* p. 13, 1st paragraph); and displaying the results according to a predetermined display format.

The invention, as now recited in claim 11, is also directed to an apparatus for analyzing gene expression patterns, comprising: an inputting means, an arithmetic unit, and a display for implementing the method recited in claim 1.

The present invention is characterized by the algorithm for classification and selection, particularly by what clustering algorithm is to be employed for each time segment in the clustering-applied region thereby varying the manner of display of expression patterns that vary with time, in accordance with the instantaneous purpose (enlargement or close examination). Thus, the invention enables the display to be varied depending on the purpose of clustering, range and time elapsed, so that a partial segment of the expression cycle of a

cell can be designated and clustering therein (a finer range). Based on such a display result, the user can observe the states of expression phases of a gene or genes in greater details.

Applicants contend that Wen fails to teach or suggest “designating a clustering-applied region 201 along the second axis and a time segment 501 shorter than a time length of the clustering-applied region 201” and “incrementally clustering the expression pattern data by the time segment 501 within the clustering-applied region 201 in a forward or reverse direction along the second axis by calculating similarity or dissimilarity for clustering within a clustering range as wide/long as the time segment 501 based on a respective reference value K set for each clustering range” according to the present invention.

In contrast, Wen’s “time of development” is essentially different from a respective threshold reference value K set for each clustering range for calculating similarity or dissimilarity (correlation between the genes upon clustering) for clustering within the clustering range. Wen’s “subclustering” is totally different from “incrementally clustering the expression pattern data by the time segment 501 within the clustering-applied region 201 in a forward or reverse direction along the second axis by calculating similarity or dissimilarity for clustering within a clustering range as wide/long as the time segment 501 based on a respective reference value K set for each clustering range” according to the invention.

Wen only compares the expression patterns of object genes for individual functions, classification and an enlarged display based on the degree of similarities of the functions and expression patterns of the genes. Wen merely displays the expression patterns of genes on an individual function basis, and does not disclose anything about varying the manner of display depending on the purpose of view, or the method of variation, classification, and display as the invention. Wen only provides a display method, but does not enable classification/clustering and selection on the display for a part of cell cycle.

Applicants contend that, as shown above, Wen does not teach or disclose each and every feature of the present invention as recited in independent claims 1 and 11. As such, the present invention as now claimed is distinguishable and thereby allowable over the rejections raised in the Office Action. The withdrawal of the outstanding prior art rejections is in order, and is respectfully solicited.

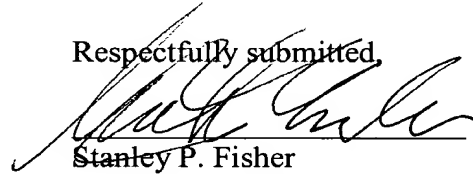
Conclusion

In view of all the above, Applicants respectfully submit that certain clear and distinct differences as discussed exist between the present invention as now claimed and the prior art

references upon which the rejections in the Office Action rely. These differences are more than sufficient that the present invention as now claimed would not have been anticipated nor rendered obvious given the prior art. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application as amended is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicant's undersigned representative at the address and phone number indicated below.

Respectfully submitted,



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